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COMMISSION OF THE EUROPEAN COMMUNITIES

DEFINITIONS OF PROPER NAME DESCRIPTORS USED IN THE EURATOM-INIS NUCLEAR DOCUMENTATION SYSTEM

by

C. VERNIMB

1972

Directorate-General for Dissemination of Information

Centre for Information and Documentation - CID

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ABSTRACT

440 definitions are given of so-called Proper Name Terms, such as GAMOV-TELLER RULES, which are used as descriptors in the EURATOM-INIS Nuclear Documentation System.

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KEYWORDS

TERMINOLOGY
DOCUMENTATION SYSTEMS

INTRODUCTION *)

In INIS (International Nuclear Information System) and ENDS (Euratom Nuclear Documentation System) more than 13,000 descriptors are used for indexing the substance of documents in the nuclear field. Most of these descriptors are self-explanatory, e.g. URANIUM, CRYSTAL COUNTERS, INVARIANCE PRINCIPLE.

But there is a group of descriptors which are composed of the name, or names, of the "discoverers" of phenomena, theories, effects, methods, equations, etc.

These "Proper Name Descriptors" are not self-explanatory, and indexers have often difficulties to identify such descriptors. E.g. if in a document only "according to Feynman" is mensioned, they do not know which of the descriptors, FEYNMAN DIAGRAM or FEYNMAN METHOD will have to be indexed. If they would have a definition of these terms, they could, from the context in the document draw the conclusion which of the descriptors would fit.

Therefore 440 definitions of such Proper Name Terms are compiled here, which show up as descriptors in the INIS and ENDS-Thesaurus. The definitions were compiled by O.C.Allkofer, H.Stichel, J.Trümper and L.Wiedecke. To find the definitions they referred to Lexika as far as possible, but they had very often to refer to documents in which the Proper Name Terms occurred. Reference to these documents was given by the Euratom Nuclear Documentation System (ENDS).

The synonyms added to the definitions are in fact very often near-synonyms and can only be considered as synonyms for the purpose of a documentation system.

The list of definitions is not complete in so far as descriptors recently introduced into the INIS and ENDS Thesaurus are not yet taken into account.

Any criticism which could lead to an improvement or completion of the definitions is appreciated.

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*) Manuscript received on February 24, 1972

ABRAGAM-POUND THEORY treats disturbed angular correlations between successive gamma radiation thrusts emitted from excited nuclei, where the disturbance is caused by the interaction of nuclear spins in the intermediate states with the crystalline electric fields.

Synonym: Abragam model

ABRAGAM-PRYCE-THEORY is a general quantum-mechanical theory of paramagnetic resonance and hyperfine structure.

ABRIKOSOV THEORY deals with the magnetic properties of the superconductors of the second kind.

ADAIR ANALYSIS is a method for determining the spin of hyperons. Having produced the hyperon in a pion-nuclear collision at forward angles, it has a defined alignment and therefore its decay angular distribution is uniquely determined for a given spin value.

AIRY FUNCTIONS is the solution of the following equations $d^2y/dx^2=xy$ when, in an investigation of diffraction near a caustic surface, an AIRY integral is introduced $Ai(x)=\frac{1}{\pi}\int_0^\infty \cos(tx+1/3t^3)dt$ which satisfies the AIRY differential equation.

Synonym: Airy integral
Airy differential equation

ALDER-WINTER THEORY treats the angular distribution of gamma radiation following from COULOMB EXCITATION in nuclei. This theory is based on second order perturbation theory.

ALFVEN NUMBER is the ratio "flow speed/Alfvèn speed" for a conducting fluid.

Synonym: Alfvèn-Mach number

ALFVEN SPEED is the velocity of a transversal Alfvèn wave (Alfvèn waves are special hydrodynamic waves). This velocity is in good approximation $B/(4\pi\rho)^{\frac{1}{2}}$. If the magnetic linear treated is loaded elastic strings exhibition a tension $B^2/4\pi$, the loading consisting of the elements of plasma which are tightly attached to the strings, then transverse waves will be propagated along the strings with a velocity equal to the ALFVEN SPEED.

Synonym: Alfvèn velocity
Alfvèn theory

ALFVEN WAVES are wave motions in an infinitely conducting plasma immersed in a uniform magnetic field which have frequencies small as compared to the ion gyrofrequency.

Synonym: Hydromagnetic waves
Magnetohydrodynamic waves

ARCHIMEDES PRINCIPLE states that the resultant upward force due to fluid pressure on a body wholly or partially submerged in a stationary fluid is equal to the weight of the fluid displaced by the body.

Synonym: Buoyancy

ARCO PROCESS is a chemical process which employs molten lead chloride as a solvent for zirconium-uranium alloys followed by regeneration of lead chloride from the lead produced; this process is used for dissolving molten fuel alloys.

ARRHENIUS EQUATION is $k=A \exp(-E/RT)$ which represents the dependence of the reaction rate k of chemical reactions on temperature. E is the activation energy.

Synonyms: Arrhenius formula
Arrhenius plot

AUGER EFFECT is a non-radioactive transition of an atom from an excited state to a lower state with the emission of an electron.

Synonyms: Auger electron
Auger coefficient
Auger yield
Auger lines
Auger transition
Auger process

BACK-GOUDSMIT EFFECT is the Paschen-Back effect of hyperfine structure.

BALMER LINES are a group of spectral lines in the visible region emitted by atomic hydrogen.

Synonyms: Balmer series
Balmer continuum
Balmer emission
Balmer spectra
Balmer transition

BANACH SPACE is a complete, normed vector space. The most important examples of BANACH SPACE have functions for their elements. A Hilbert space is a particular example of a Banach space.

BARKAS FORMULA is an extrapolation formula for going from the measured ranges to very small ranges. Barkas has made precise measurements of the energy-range relation for charged particles in nuclear emulsions which are tabulated.

Synonyms: Barkas table

BARKHAUSEN EFFECT is the discovery that a series of minute jumps in the magnetization of iron or another ferromagnetic substance occur as the magnetizing field is continuously increased or decreased.

BARTLETT FORCE is a phenomenologically postulated force between two nucleons proportional to an operator, exchanging spins of the two particles but not their space coordinates.

BAYARD-ALPERT GAGE is an ionization manometer of very high sensitivity (range to 10^{-10} Torr).

Synonyms: Bayard-Alpert ionization gage
Bayard gage
Alpert method

BBGKY EQUATION is a hierarchy of rigorous equations connecting the exact 1,2,....n-particle distribution functions in classical statistical mechanics established by Born, Bogoliubov, Green, Kirkwood and Yvon. This system is infinite and it is necessary to close it approximately in some way in order to be able to solve it. The counter-part of this method in quantum mechanics is the method of the Green functions.

Synonyms: Born-Bogol.-Green-Kirk.-Yvon
BBGKY theory
BBGKY hierarchy
Bogoliubov theory

BCS THEORY is a quantum-mechanical theory of superconductivity (Bardeen-Cooper-Schrieffer theory). The exchange of virtual phonons and the short range COULOMB repulsions between the members of a pair of electrons having spins in opposite directions lead to a correlation of the electrons in a superconductor.

Synonyms: Bardeen-Cooper-Schrieffer theory
Bardeen-Pines theory
Bardeen model

BEATTLE-BRIDGEMENT EQUATION is a form of the equation of state, relating the pressure, volume and temperature of a gas, and the gas constant;

$$p = RT \frac{(1-\varepsilon)}{V^2} (V + B) = A/V^2$$

BEER LAW states that the absorption coefficient for light passing through a solution of a given salt in non-absorbing solvent is proportional to the concentration.

Synonyms: Beer-Lambert law
Lambert-Beer law

BELYAEV THEORY is an application of modern superconductivity theory to nuclear structure. Besides the shell model potential a paring force is introduced as a residual force acting between two nucleons. After applying the quasi-particle transformation of Bogoliubov-Valatin the energy gap in the spectra of even nuclei can be easily understood.

BERL SADDLES are forms like Raschig rings for chemical reactions with extraction columns; they are used for chemical separation processes of gases and solutions.

BERNOUILLI LAW is a statement of the law of conservation of energy for steady flow of an inviscid fluid. If the fluid may be regarded as incompressible, the sum $p \times 1/2\, \varrho v^2 + \varrho gh$ where p is the local hydrostatic pressure, $1/2\, \varrho v^2$ the kinetic pressure and ϱgh is the local gravitational potential, is constant along any one flowline.

Synonym: Bernouilli theorem

BESSEL FUNCTIONS is the cylindrical functions solution of $x^2y'' + xy' + (x^2 - n^2)y = 0$, which is a second order equation with regular (singular) point at $x=0$ and an irregular one at $x=\infty$ of the Bessel differential equation.

Synonyms: Bessel differential equation
Neumann functions
Hankel functions

BET METHOD is a theory by Brunauer, Emmett and Teller (BET) about the principle of operation of the sorptmeter, an instrument for measuring the surface area of solid samples.

Synonym: Brunnauer-Emmett-Teller theory

BETHE-BLOCH RELATION shows the energy loss by ionization and excitation of an electrically charged particle passing through matter.

Synonyms: Bethe-Bloch formula
Bethe-Bloch theory
Bethe-Bloch-Williams theory

BETHE-GOLDSTONE EQUATION is an approximate treatment of the many-body problem for nucleons with only pair correlations taken into account.

Synonyms: Bethe-Goldstone functions
Bethe-Goldstone eigenfunctions
Bethe-Goldstone approximation

BETHE-HEITLER THEORY concerns either the energy loss of charged particles by radiative collision (bremsstrahlung) or the pair production of charged particles by radiation within matter (pair production).

Synonyms: Bethe-Heitler equation
Bethe-Heitler formula
Bethe-Heitler-Schiff formula

BETHE-SALPETER EQUATION is an equation of the wave function (bound state or scattering state) of two interacting particles in quantized field theory formulated in a completely relativistic covariant manner. The kernel of this equation is given by the sum over all irreducible Feynman diagrams.

Synonyms: Bethe-Salpeter method
Bethe-Salpeter theory

BHABHA SCATTERING formula describes the scattering of electrons and positrons taking into consideration the spin of the particles.

Synonyms: Bhabha formula
Bhabha theory

BIEDENHARN-ROSE THEORY is a general quantum-mechanical treatment of angular correlations of successive radiations in the de-excitation of excited nuclei.

BINGHAM MATERIAL is a material exhibiting a yield limit σ_0 and viscous resistance to flow for stresses above this limit:

$$\dot{\varepsilon} = \frac{1}{\nu}(\sigma - \sigma_0) \qquad \sigma > \sigma_0$$

$$\dot{\varepsilon} = 0 \qquad \sigma > \sigma_0$$

BIOT-SAVART LAW gives the magnetic field in the neighborhoud of a long, straight conductor carrying a steady current I. The law may be written

$$B = \mu_0 I/2\pi r$$

where r is the normal distance from the conductor and I is the current flowing in the conductor.

BITTER MAGNETS are used for detecting domain boundaries at the surface of ferromagnetic crystals. If a drop of colloïdal suspension of ferromagnetic particles is placed on the surface of the crystals, the particles will collect along the domain boundaries where the field is strongest.

Synonym: Bitter patterns

BJERRUM METHOD is a theory about the formation of ion pairs in solutions; with this method the size of ion pairs can be determined.

BLAIR MODEL is a model for the elastic scattering of heavy ions on nuclei. It is assumed that from the Coulomb scattering amplitude all the partial waves with $l < l_{COUL}$ can be subtracted because they are absorbed in the collision. (l_{COUL} is defined as that angular momentum for which the classical turning point is equal to the sum of the nuclear radii). For details, see: Pys.Rev.95, 1218(1954).

Synonyms: Blair phase rule
Blair theory
Blair scattering theory

BLASIUS EQUATION is the differential equation $2 f''' + f'' = 0$ which describes the stream function:

$$\tau = \sqrt{(v \times U_\infty)} \cdot f(\eta); \qquad \eta = \sqrt{U_\infty / v_x}$$

in boundary layer flow past a flat plate at zero incidence. The function $f(\eta)$ determined by the above equation is called the Blasius function.

Synonym: Blasius function

BLATT-BIEDENHARN FORMALISM treats differential cross sections for nuclear reactions by taking into consideration the conservation of angular momentum.

BLEANEY METHOD is a method for aligning nuclei by cooling a paramagnetic salt with one ion per unit cell to temperatures of about 0.01° K. At these temperatures the lower h.f.s. levels are preferentially populated and an alignment of the nuclei is obtained. The underlying mechanism is thus of magnetic interaction between the nucleus and the electrons of a paramagnetic ion.

BLOCH EQUATIONS are describing the macroscopic effects of magnetic resonance in a sample containing net nuclear magnetic moments. With this method the magnetic moment of nuclei can be measured.

Synonyms: Bloch method
Bloch-Siegert effect

BLOCH THEORY describes an electron gas in solids by using a quantum-mechanical wave function which introduces the periodicity of the lattice. This so-called Bloch function is a solution of the Schroedinger equation with a periodic potential (Bloch theorem).

Synonyms: Bloch function
Bloch theorem
Bloch electrons
Bloch integral equations
Bloch wave functions
Bloch waves

BLOCH WALL is the transition layer between adjacent ferromagnetic domains magnetized in different directions.

Synonym: Bloch domain

BOGOLIUBOV METHOD is a new method developed by Bogoliubov and co-workers in constructing a quantum-mechanical theory of superconductivity which is an immediate generalization of the method used by Bogoliubov in formulating a microscopic theory of superfluidity. This method makes use of Bogoliubov transformation. In the first approximation some results (ground state and one-fermion excited state) are the same as in the BCS theory, but the Bogoliubov method avoids the shortcomings of the BCS theory (which treats the electron-electron interaction in a purely schematic way, is violently gauge-dependent and fails to answer the question as to the validity of the procedure and the role of the Coulomb interactions) and yields more results (spectrum of the collective mode of excitation).

BOGOLIUBOV TRANSFORMATION is a canonical transformation of the Hamiltonian of a system of bosons or fermions so that it is approximately expressed as the sum of the energies of a system of quasi particles. The transformation mixes particle creation and annihilation operators. Bogoliubov introduced this transformation in his theory of superfluidity and superconductivity.

Synonyms: Bogoliubov-Valatin transformation
Bogoliubov-Valatin relation

BOHM CRITERION

Synonyms: Bohm-Gross method
Bohm theory

BOHR MAGNETON is a unit of magnetic moment used in atomic physics. It is the magnetic moment of a single electron at rest.

BOHR THEORY is a semiclassical theory about the structure of the hydrogen atom to describe the optical spectra. Sommerfeld and Wilson made independently a generalization of this theory.

Synonyms: Bohr orbits
Bohr radius
Bohr atom
Bohr-Sommerfeld quantum theory
Bohr theory of atomic spectra
Bohr frequency condition

BOHR-WHEELER THEORY is an analytical theory of the nature of nuclear fission and the conditions under which it might occur, based upon the liquid-drop model.

BOLTZMANN CONSTANT is the gas constant per atom ($k=1{,}38.10^{-16}$ erg/deg).

BOLTZMANN EQUATION describes the evolution of the velocity function of a gas, proceeding through mechanical changes (flow) and collisions.

Synonyms: Boltzmann transport equation
Boltzmann collision integral
Boltzmann collision operator
Maxwell-Boltzmann equation
Maxwell-Boltzmann transport equation
Born-Green-Yvon equation

BOLTZMANN STATISTICS are the statistics of classical thermodynamics. Application of these statistics to microphysical systems leads to the Boltzmann distribution of energy states, the satistical weights of which are called Boltzmann factors.

Synonyms: Boltzmann factor
Boltzmann distribution
Boltzmann approximation
Maxwell-Boltzmann distribution
Maxwell velocity distribution
Maxwell statistics

BOLTZMANN-VLASOV EQUATION is the basic equation which governs a high temperature plasma in which the collision mean free path is much longer than the dimensions of the system.

Synonyms: Vlasov equation
Vlasov instability

BORN APPROXIMATION is the computation of a quantum-mechanical transition matrix element in first-order perturbation theory.

Synonyms: Born cross sections
Born series
Born matrix

BORN-HABER CYCLE is a thermodynamic cycle of operations used to obtain the electron affinities of certain atoms. This cycle is commonly applied to crystalline metallic halides.

BORN-INFELD THEORY is a non-linear modification of the Maxwell equations in which the electromagnetic field is described by four vectors E, B, D, H, two of which are functions of the other two.

BORN-MAYER EQUATION expresses the binding energy of an ionic crystal as a sum of four terms: one term represents the Coulomb energy between the charged ions, the second term comes from the repulsive potential between the outer closed shells of the ions, the third term is determined by the Van der Waals forces and the fourth term is the zero-point energy.

Synonyms: Born-Mayer potential
Born repulsive energy
Born repulsion

BORN-OPPENHEIMER APPROXIMATION is a method for calculating the force constants between atoms in a molecule or solid, based on the observation that the motion of the electrons is so rapid compared with that of the heavier nuclei, that it can be assumed that the electrons follow the motion of the nuclei adiabatically.

Synonym: Born-Oppenheimer method

BORN-VON KARMAN THEORY is a modification of the Debye theory of specific heat of solids in which, instead of considering the medium to be an elastic continuum, it is considered to consist of discrete masses coupled to each other by elastic springs.

BOSE-EINSTEIN CONDENSATION is the rapid increase in population of the ground state of a Bose-Einstein gas if its temperature is reduced below a critical temperature.

Synonym: Einstein condensation

BOSE-EINSTEIN GAS is a gas composed of particles obeying the Bose-Einstein statistics.

Synonym: Bose gas

BOSE-EINSTEIN STATISTICS are a type of quantum statistics having to do with the distribution of bosons among various allowed energy values, the quantization of these energy values being taken account of.

BRAGG CURVE is a graph for the average number of ions per unit distance along a beam of monoenergetic ionizing particles passing through a gas; it is also a graphical relationship between the average specific ionization of an ionizing particle and some other variable.

Synonyms: Bragg peak
Bragg zone

BRAGG CUTOFF is a certain cutoff below which energy neutrons are not Bragg-reflected by crystals. This effect is used for producing low energy neutron beams by absorption (deflection) of the more energetic component.

BRAGG-GRAY CHAMBER is an ionization chamber with "air walls", built according to Bragg-Gray cavity principle.

Synonyms: Bragg-Gray principle
Bragg-Gray stopping power
Bragg-Gray dosemeters

BRAGG REFLECTION is the reflection of X-rays or neutrons by crystal lattices. The angle of deflection is given by the Bragg law (Bragg equation). The Bragg reflection is widely used for crystal analysis.

Synonyms: Bragg intensities
Bragg angle
Bragg condition
Bragg diffraction
Bragg law
Bragg spectrometers
Bragg spectrographs

BRAGG-WILLIAMS EQUATION represents the configuration entropy of a lattice as function of absolute temperature.

Synonyms: Bragg-Williams theory
Bragg-Williams transition

BRAYTON CYCLE is a gas turbine cycle which consists of an isentropic compression, constant pressure expansion (heat addition), isentropic expansion and constant pressure contraction (heat rejection). This is the ideal Brayton cycle. It is applied particularly to small power plants (e.g. in space technology).

BREIT-RABI FORMULA shows the hyperfine splitting of atomic energy levels for atoms with spin = 1/2 in the presence of an external magnetic field.

BREIT THEORY

Synonym: Breit equation

BREIT-WIGNER FORMULA is a one-level dispersion formula relating the cross section of a particular nuclear reaction to the energy E of the incident particle and to the energy E_o of a resonance level of the compound nucleus, when E is close to E_o.

Synonyms: One-level dispersion formula
Single-level resonance formula

BRUECKNER METHOD is a method for studying the nucleus in which it is assumed that the nucleus is a many-body system interacting via two-body forces only. This theory establishes relations between nuclear forces and the experimental properties of nuclei.

Synonyms: Brueckner-Gammel potential
Brueckner-Gammel-Weitzner theory

BERGERS VECTOR is a vector representing the displacement of the material of the lattice required to create a dislocation.

CARLSON METHOD is a method of approximate solution of the transport equation, in neutron transport theory, whereby the integral term describing scattering is approximated by dividing the angular range into intervals in each of which neutron flux is assumed to vary linearly.

Synonym: Carlson SN-method

CASE METHOD is a singular integral method for solving neutron diffusion problems in an isotopic scattering medium.

Synonym: Case theory

CHANDRASEKHAR THEORY calculates, in the development of the theory of outer layers of a star, a model which defines a fraction of the star's radius in such a way that it contains 90 per cent of the total stellar mass.

Synonym: Chandrasekhar-Fermi theory

CHAPMAN-ENSKOG THEORY is a transport theory for gases.

CHAPMAN-JOUGUET CONDITION is a condition for steady-state detonations. It is a relation for the lowest possible shock wave velocity, depending on the densities and pressures in front of and behind the incident shock.

CLEBSCH-GORDAN COEFFICIENTS are the coefficients in the decomposition of a product of two irreducible representations of a given Lie group into a series of irreducible representations. In case of the three-dimensional rotation group these coefficients are sometimes called Vector Coupling coefficients or Wigner coefficients; they determine the coupling of angular moments in quantum mechanics.

Synonyms: Vector Coupling coefficients
Wigner coefficients

COMPTON EFFECT is the elastic scattering of photons by another elementary particle.

Synonyms: Compton shift
Compton wavelength
Compton electron
Compton recoil
Compton scattering

CORIOLIS FORCE is the apparent force acting on particles moving relative to a rotating frame of reference.

Synonyms: Geostrophic force
Deviation force
Coriolis effect
Coriolis parameter
Coriolis acceleration
Coriolis interaction

COSMOLOGICAL MODELS are models for the universe as a whole; specifically, models based on Einstein's general relativity theory.

Synonym: Einstein-De Sitter model

COULOMB CORRECTION is a correction to the interaction or the decay of elementary particles caused by the Coulomb field acting between charged particles.

COULOMB ENERGY is either that part of the binding energy of a solid associated with the electrostatic interaction of ions and electrons, or that part of the binding energy of a nucleus associated with the electrostatic interaction of protons with a nucleus.

COULOMB EXCITATION is an excited state caused by the nucleus when a high energy change particle passes close to the nucleus of an atom.

COULOMB FIELD is the field of a point electric charge which can be described by a potential of the form $V = -ze^2/r$

Synonyms: Coulomb potential
Coulomb barrier
Coulomb repulsion
Coulomb forces
Coulomb law
Coulomb attraction

COULOMB SCATTERING is the scattering of charged particles by an atomic nucleus under the influence of the Coulomb forces exerted by the nucleus as a whole, i.e. the internal nuclear force field is neglected.

CURIE-WEISS LAW is a change in the relationship of magnetic susceptibility to temperature which is accompanying the transition from ferromagnetic to paramagnetic properties, and which occurs in iron and other ferromagnetic substances at the Curie point.

Synonyms: Weiss constant
Weiss-Curie constant

DE BOER THEORY deals with the theory of a compressed gas. It gives a density and activation expansion of the two-point distribution function, which is a generalization of the Ursell expansion. It deals also with calculation of the transition temperature and the second virial coefficient of liquid helium 3 based essentially on the 6-12 interaction.

DEBYE LENGTH is a concept taken over from the Debye-Hückel theory of electrolytes and applied to a plasma. The Debye length λ_D is a characteristic length in a plasma outside of which the electric field of a charged particle is shielded by charged particles of opposite sign. In the neighborhood of a single charge q the electrostatic potential φ is given by

$$\varphi = q/r \exp(-r/\lambda_D), \lambda_D = \left(\frac{kT}{4\pi ne^2}\right)^{0,5}$$

where r is the distance from the charge, k the Bolzmann constant, n the electron density, and T the absolute temperature.

Synonyms: Debye cutoff
Debye shielding length
Debye distance
Debye shield
Debye radius

DEBYE SPECIFIC HEAT THEORY considers the specific heat of a solid in terms of thermal vibrations of the lattice. The continuous spectrum of vibrations has a maximum frequency which is characteristic of a given solid (Debye frequency). The molar specific heat is given in terms of the Debye temperature θ by the following relation

$$c_v = 3 N k f (\theta/T)$$

where f is the Debye function, N is Avogadro's number and k is the Boltzmann constant. At high temperatures this relation leads to the Dulong-Petit law, and at low temperatures to the Debye T^3 law.

Synonyms: Debye crystal model
Debye-Einstein model
Debye solids
Debye spectra
Debye T^3 law
Debye function
Debye phonon spectrum

DE HAAS-VAN ALPHEN EFFECT is a periodic variation with changes in the applied magnetic field component perpendicular to the principal axis of the crystal showed by the diamagnetic susceptibility of the conduction electrons of many complex metals at low temperatures.

Synonym: De Haas-Van Alphen oscillations

DELBRUECK SCATTERING is the scattering of light by a Coulomb field, a process which, according to quantum electrodynamics, occurs as a scattering of light by the virtual electron-positron pairs produced by the Coulomb field.

DIESEL ENGINE is an internal combustion engine. Oil is injected when the air in the cylinder is heated to above inflammation point by compression. By suitable control of the injection process the pressure inside the cylinder is kept nearly constant during the combustion phase.

Synonym: Diesel generator

DIRAC APPROXIMATION interprets the positrons as holes in a distribution with almost all states of negative energy filled.

Synonym: Dirac hole theory

DIRAC COSMOLOGY suggests that the gravitational constant varies inversely with the age of the universe. This theory describes fundamental properties of elementary particles and of the universe, e.g. that the rate of beta decay is a function of the age of the universe.

DIRAC DELTA FUNCTION $\delta(x-x_0)$ is a linear functional which attaches every function of its value at the point x_0, i.e.

$$\delta_{x_0}[f] = f(x_0)$$

DIRAC EQUATIONS are the relativistic quantum-mechanical wave equations for particles with a spin = 1/2.

Synonyms: Dirac operators
Dirac electron theory
Dirac matrices

DIRAC FORM FACTOR is one of the two form factors appearing in the cross action electron-nucleon scattering. The invariant function multiplying the Dirac current in the decomposition of the one-nucleon matrix element of the electromagnetic current is called the Dirac form factor.

DIRAC MAGNETIC POLES determine the magnetic field by sources of point-magnetic poles according to a theory predicted by Dirac.

Synonym: Dirac monopoles

DIRAC RADIATION THEORY divides the electromagnetic interactions into static Coulomb interactions and into interactions between charges and transverse light waves which were quantized. This theory was later completed to form the general theory of quantum electrodynamics.

DITTUS-BOELTER EQUATION expresses the Nusselt number as a function of Reynolds number and Prandtl number.

DOPPLER EFFECT is the effect of spectral shift due to the relative motion of radiation source and observer.

Synonyms: Doppler width
Doppler profiles
Doppler broadening
Doppler breadth

DOPPLER REACTIVITY is the temperature coefficient of reactivity calculated by the Doppler effect.

Synonyms: Doppler coefficient
Doppler temperature coefficient

DYSON REPRESENTATION is the most general representation for matrix elements of the time-ordered product of two field operators in momentum space by considering Lorentz invariance, local community and some other axioms of quantum field theory.

Synonyms: Jost-Lehmann representation
Jost-Dyson representation
Jost-Lehmann-Dyson representation

ECCLES-JORDAN CIRCUIT is popularly called a bistable multivibrator.

ECKART BARRIER

Synonym: Eckart-Bethe potential

EGELSTAFF MODEL is a model for the scattering of thermal neutrons on light or heavy water, based on the picture that the behavior of atoms in water may be represented by a combination of a diffusion and an oscillatory motion.

Synonym: Schofield method

EHRLICH ASCITES are cancer cells which are artificially produced in animals; they are transplanted in mice or rats for the study of radiation injuries.

Synonym: Ehrlich ascites carcimona

EINSTEIN COEFFICIENTS are introduced in the Einstein derivation of Planck's formula for black-body radiation and describe the probabilities of induced emission, spontaneous emission and absorption of a photon by a microphysical system.

Synonyms: Einstein absorption
Einstein coefficient of spontaneous emission
Einstein coefficient of induced emission
Einstein coefficient of absorption emission

EINSTEIN CRYSTAL MODEL describes the vibrations of a lattice consisting of N atoms as oscillations of 3N harmonic oscillators with quantized energies. This model was the first quantum-theoretical approach to the variations of specific heats with temperature. Now it plays a role in the theory of specific heats at low temperature and in the theory of neutron scattering by solids.

Synonyms: Einstein specific heats
Einstein oscillator model
Einstein model
Einstein crystals

EINSTEIN DIFFUSION RELATION is the relation between diffusion coefficient and mobility of a charged particle (ion) in a lattice or ionic solution.

Synonyms: Einstein diffusion mobility relation
Einstein ratio
Einstein relation

EINSTEIN FIELD EQUATIONS are a set of differential equations for the components of the metric fundamental tensor of a space, which contain the "sources" of gravitation in the form of the energy stress tensor.

Synonym: Einstein equations

EINSTEIN-SCHROEDINGER THEORY attempts to obtain a unified theory of gravitation and electromagnetism.

Synonyms: Unified field theory
Einstein field theory

EINSTEIN-STOKES EQUATION describes the diffusion of particles (of such a size that they obey Stokes's law) in a gas or liquid.

Synonym: Einstein-Stockes formula

ELLIOT MODEL is a version of the nuclear shell model. Starting with a spherical oscillator potential for the single-particle states, the various degenerate many-particle states are mixed in such a way that the resulting state transforms according to an irreducible representation of Group U(3). Each representation contains a set of states with different values of the total orbital angular momentum. It was found that these values are precisely those which can be obtained from a series of rotational bands cut off at some upper limit.(For details see: Proc.Roy. Soc. A. 245, 128+562 (1958).

ELLIOT-STEVEN THEORY is a theory about ion interactions in lattices with the static ionic surroundings in rare earths.

EOETVOES EXPERIMENT is an experiment to determine the ratio between gravitational and inertial mass.

ERICSON THEORY describes the statistical fluctuations of nuclear-reaction cross-sections within the statistical theory of the compound nucleus.

Synonyms: Ericson fluctuations
Ericson model

EUCLIDEAN SPACE is a Riemannian space in which it is possible to introduce a coordinate system with respect to which the metric $g_{\mu\nu}$ is equal to the Kronecker delta

$$g_{\mu\nu} = \delta_{\mu\nu}$$

at every point.

EULER ANGLES describe the orientation of a rotated coordinate system relative to a fixed coordinate system.

EYRING THEORY is an absolute reaction rate theory which has been applied to transport processes in dense gases and liquids. It is assumed that in all these transport processes (viscosity, diffusion, thermal conductivity) the basic kinetic process is the motion of a molecule to a vacant site near it.

FABRY-PEROT INTERFEROMETER is a multiple-beam interferometer of high resolution for two very close lines.

Synonym: Fabry-Perot etalon

FANO TENSOR is an irreducible tensor. The most general quantum-mechanical description of the polarization state of a particle (elementary particle or nucleus) is given by the spin density matrix which may be decomposed with respect to irreducible tensors called Fano tensors.

Synonyms: Wigner-Fano theory
Statistical tensors
Spin tensors
Spin tensor moments
Polarization tensors

FARADAY CAGE is a screened room, the metal screening being taken directly to earth, in order to carry out electrical measurements of high sensitivity in the absence of external fields.

Synonyms: Faraday cup
Faraday chambers
Faraday shield

FARADAY CURRENT is the excess of residual current obtained in practical polarography in the absence of deliberate additions to the solution when the theoretical current required to charge the double-layer condenser at the mercury-solution interface. It is due to the reduction of small traces of impurity in the solutions, i.e. dissolved copper, oxygen or mercury.

Synonym: Faradaic admittance

FARADAY INDUCTION is the electromotive force induced in a circuit, being proportional to the time rate of change of the flux of magnetic induction linked with the circuit.

FARADAY LAW are the following laws: - In electrolytic decomposition the number of ions charged or discharged at an electrode is proportional to the current passed. - The amounts of different substances deposited or dissolved by the same quantity of electricity are proportional to their equivalent weights.

Synonym: Faraday constant

FARADAY METHOD is a method for measuring susceptibilities of para- and diamagnetic materials.

FARADAY ROTATION is the rotation of the plane of vibration of polarized electromagnetic waves transmitted through the medium in the direction of the field, when a transparent isotropic medium is placed in a magnetic field.

Synonym: Faraday effect

FEATHER ANALYSIS is a technique for the determination of penetration depth in aluminum for beta particles by comparison of the absorption curve with the absorption curve of a reference species, usually Bi 120.

FEINBERG-PAIS THEORY is a theory about weak interactions of leptons. Based on a Yukawa interaction between the leptons and intermediary boson, an attempt is made to sum up an infinite number of ladder graphs.

Synonym: Peratization procedure

FERMAT PRINCIPLE states that a ray of light from one point to another, including reflections and refractions, will follow that path which can be followed in the least time.

FERMI ACCELERATION is a Fermi interpretation of primary cosmic-ray particle acceleration in interstellar space.

Synonyms: Fermi collision theory
Fermi mechanism

FERMI GAS is an assembly of independent particles obeying Fermi-Dirac statistics and the Pauli exclusion principle.

Synonyms: Fermi-Dirac gas
Fermi limit
Fermi system
Fermi fluid
Fermi liquid
Fermi-Dirac statistics

FERMI GAS MODEL is a model where the aggregate of nucleons in a nucleus (with great mass number) is treated as a Fermi gas.

FERMI INTERACTION is a direct interaction between four Dirac fields. The type of interaction was first introduced to describe beta decay, and then generalized to all primary weak interactions.

Synonyms: Fermi formulation
Fermi matrix
Fermi functions
Fermi beta theory
Fermi coupling
Fermi transition
Fermi-fermion interaction
Fermi coupling constant
Fermi theory of beta decay
Fermi-Weizsaecker formula
Fermi pseudopotential
Universal Fermi law

FERMI LEVEL is the point on an energy level diagram corresponding to the top of the energy distribution of electrons in a metal.

Synonyms: Fermi potential
Fermi distribution
Fermi energy
Fermi surface
Fermi temperature
Fermi sphere

FERMI MODEL is the production of pions in a high-energy nucleon-nucleon interaction, regarding the interacting particles as a highly heated volume (thermodynamical model).

FERMI PLOT is a graph of the beta particle spectrum. It is used to determine the character of beta transition and maximum energy. It is a straight line for allowed transitions and some forbidden ones.

Synonyms: Kurie plot
Fermi-Kurie plot
Fermi analysis
Fermi diagram

FERMI RESONANCE is the accidental degeneration of two vibrational levels belonging to different vibrations in polyatomic molecules.

FERMI-SEGRE FORMULA is a formula to calculate the magnetic moment when hyperfine separation is measured.

Synonym: Fermi-Segre relation

FERMI-TELLER THEORY is a theory which describes the capture of negative muons in matter. The atomic-capture probability is proportional to the nuclear charge Z.

Synonym: Fermi-Teller Z law

FERMI-YANG THEORY is a theory about nucleon-antinucleon systems in bound states.

Synonyms: Fermi-Yang-Sakata model
Fermi-Yang model
Fermi-Yang hypothesis
Fermi-Sakata model

FESHBACH MODEL is a unified theory of nuclear reactions based on the manybody SCHRÖDINGER equation. Compound nucleus formation, in other words the optical model, arises in certain approximations. (For details see: Ann.Phys.5, 357 (1958).

FESHBACH-WEISSKOPF MODEL is an attempt to describe the behavior of average total neutron cross sections for complex nuclei. The model is based on the Bohr hypothesis that the mean free path of the incoming neutron within the nucleus is very short, i.e. a compound nucleus is formed. This picture is realized by imposing a boundary condition for the neutron wave function at the nuclear surface. The model fails, e.g. with respect to the dependence of average cross sections on the atomic number. (For details see: Phys.Rev.76, 1550 (1949).

FEYNMAN DIAGRAM develops a theory to simplify all calculations involving positrons and electrons interacting with external fields (positron theory). This theory was extended to include interactions between the particles themselves (quantized field theory). The Feynman diagram gives a graphical picture of the matrix elements of interacting particles and electromagnetic radiation.

Synonyms: Feynman Graph
Feynman formalism
Feynman positron theory
Feynman-Dyson method
Feynman-Dyson theory
Feynman rules

FEYNMAN-GELL-MANN THEORY is a theory of beta decay and other decay processes with weak interactions based on the two-component theory of the neutrino.

Synonym: Feynman-Gell-mann equations

FEYNMAN HELIUM THEORY is an extension of the Landau theory of liquid helium II in which the liquid is treated more like a solid than a gas.

FEYNMAN METHOD is used, in neutron transport theory, for the analysis of the integral equation form of the theory.

Synonyms: Feynman-Welton method
Welton method

FICK LAW states that the rate of diffusion of particles across a given area is proportional in amount and opposite in sign to the concentration gradient. Thus $I = -D \operatorname{grad} \varrho$, where I is current density, D the diffusion coefficient, and ϱ density.

FIERZ INTERFERENCE is a special phenomenon in beta decay theory. If there are either interferences of S- and V-interactions or of T- and A-interactions there is an additional term in the beta spectrum.

Synonym: Fierz term

FIERZ-PAULI THEORY permits to describe elementary particles with arbitrary spin by wave functions satisfying first-order differential equations. The formalism used is the general spinor calculus.

Synonym: Dirac-Fierz-Pauli equations

FOCK FUNCTIONALS are the generating functionals for the probability amplitudes in Fock space. This method is more of his historical interest, because it is not applicable to quantum field theories with a non-vanishing vacuum polarization.

FOCK REPRESENTATION is the particle number representation in Hilbert space of a many-body problem in its second quantized form.

FOKKER ACTION PRINCIPLE is a variational principle leading to a differential equation which describes the classical interaction of point-charged particles without introducing a radiation field.

Synonyms: Fokker least action principle
Action principle of Fokker-Scwarzschild tetrode

FOKKER-PLANCK EQUATION is a transport equation similar to the Boltzmann equation. The motion of a test particle in a plasma, or a test star in a globular cluster, has been treated using this equation.

Synonyms: Fokker-Planck coefficients
Fokker-Planck collision term

FOLDY TERM appears after applying the Foldy-Wouthuysen transformation to the Dirac equation with Coulomb interaction. It describes the interaction between an electric field and the electric dipole moment generated by a moving magnetic moment.

FOLDY-WOUTHUYSEN TRANSFORM is a canonical transformation of a four-component wave function satisfying the Dirac equation into a two-component representation.

Synonyms: Foldy-Wouthuysen representation
Foldy-Wouthuysen approximation
Foldy-Wouthuysen-Tani representation
Foldy-Tani transformation

FOURIER ANALYSIS is the process of finding a representation of a function as a Fourier series.

Synonyms: Fourier expansion
Fourier decomposition
Fourier superposition
Fourier representation
Fourier series
Fourier coefficients
Fourier components

FOURIER HEAT EQUATION is an empirical law relating to the conduction of heat and representing the relation between heat flux and temperature gradient.

Synonyms: Fourier law
Fourier equation

FOURIER TRANSFORMATIONS are integral transformations widely used in the theory of differential and integral equations.

Synonym: Fourier transform method

FOWLER-NORDHEIM THEORY describes quantitatively the photoelectric effect for metallic surfaces. Photoelectric yield is given as $Y = A\ T^2\ F$, where F is the Fowler function.

Synonyms: Fowler function
Fowler equation
Fowler-Nordheim work function
Fowler formula

GAMMEL-THALER POTENTIAL

Synonyms: Gammel-Christian-Thaler theory
Gammel-Thaler theory
Gammel-Thaler matrix
Gammel-Thaler phase

GAMOW BARRIER is a barrier shown by a potential wall to an alpha particle inside the nucleus, which prevents a low-energy particle on one side of the region from passing to the other side.

Synonyms: Gamow factor
Gamow-Bach region

GAMOW-TELLER RULES is a selection rule in the theory of beta decay for the angular momentum.

Synonyms: Gamow-Teller theory
Gamow-Teller interaction
Gamow-Teller transition
Gamow-Teller selection rules
Gamow-Teller coupling
Gamow-Teller decay

GARTENHAUS POTENTIAL is the nucleon-nucleon potential obtained in fourth-order perturbation theory within the static Chew-Low model of meson-nucleon interaction.

GAUGE INVARIANCE is the invariance of a field theory with respect to gauge transformations of the first or second kind.
First kind: The symmetry operator is given by

$$\mathcal{U}(\varphi) = e^{i \sum_i Q_i \varphi_i}$$

where Q_i is a generalized charge operator.
Second kind: A well-known example is the invariance of quantum electrodynamics with respect to the substitutions

$$\psi \to e^{ie\lambda(x)}\psi \quad , A_\mu \to A_\mu + \delta_\mu \lambda(x)$$

Synonyms: Gauge transformation
Gauge group

GAUSS ERROR FUNCTION is defined by the proper integral

$$\operatorname{erf}(t) = \frac{2}{\sqrt{\pi}} \int_0^t e^{-y^2} dy$$

It gives a measure for the probability that a single measurement has a certain error.

GAUSS FUNCTION is often called the normal distribution. It is given by

$$P(x) = \frac{e^{-x^2/\,2\sigma^2}}{\sigma\sqrt{\pi}}$$

The area under the curve from x_1 to x_2 represents the probability of obtaining a value of x between x_1 and x_2.

Synonyms: Gauss distribution
Normal distribution

GAUSS QUADRATURES The Gauss quadratures formula is any formula of the form

$$\int_a^b w(x)\, f(x)\, dx = \sum_0^n a_i f(x_i) + R$$

where the density function $w(x) \geqslant 0$; the coefficients a_i are constant and depend only upon the function $w(x)$ and the range of integration, and the abscissae x_i are selected so that the remainder R vanishes whenever $f(x)$ is a polynominal of degree $2n+1$ or less.

GAUSSIAN POTENTIAL is a phenomanological potential sometimes used to describe the interaction between nuclear particles. It has the form

$$V(r) = e^{-r^2/b^2}$$

Synonyms: Gauss well
Gauss nuclear model

GEIGER-NUTTALL RELATION is an empirical relationship between the range of an alpha-particle in air and the half-time of natural alpha-emitting radionuclides.

GEISSLER TUBE is a gas discharge tube at moderate exhaustion which exhibits bright glow discharges and sometimes marked fluorescence effects.

GEFLAND-LEVITAN EQUATION is a general solution for the inversion problem in non-relativistic potential theory; given the scattering phase shifts and the energies of the bound states, the potential reproduction the input data by solving an integral equation may be determined.

GELL-MANN-BRUECKNER MODEL is the description of an atom in which the exchange interaction is replaced by the effective interaction. It is based in the Thomas-Fermi model.

GELL-MANN MODEL is a theory which describes the resonance peaks of the cross section by scattering of pions on nucleons.

Synonym: Gell-mann-Goldberger theory

GELL-MANN THEORY is a theory concerning the behavior of strange particles. By introducing the strangeness quantum number the interactions and the particles could be classified in the Gell-mann-Nishijima scheme.

Synonyms: Neeman model
Nishijima model
Gell-Mann-Nishijima scheme
Gell-Mann-Pais theory
Wagner model
Uhlenbeck interaction

GENERAL RELATIVITY THEORY states that the geometry of space is determined by the gravitational interaction of the different bodies occupying space.

Synonyms: Einstein gravitation theory
Einstein space
Einstein-Rosen bridge
Einstein-Rosen manifolds
Einstein-Infeld-Hoffman problem
Einstein equivalence principle

GERJUOY-STEIN THEORY calculates the cross sections for rotational excitation of a homonuclear diatomic molecule by collisions with very slow electrons, assuming the mechanism to be the long-range quadrupole interaction.

GIBBS ADSORPTION EQUATION is an equation relating adsorption and surface tension, derived by thermodynamics.

GIBBS DISTRIBUTION or canonical distribution is the statistical distribution of small macroscopic sub-systems with energy E_n of a large closed system with temperature T. The probability w_n of a sub-system being in a state with energy E_n is

$$w_n = A \exp(-E_n/kT)$$

Synonyms: Gibbs canonical distribution
Canonical distribution

GIBBS-DUHEM EQUATION expresses a connection between the increments of the intensive variables which characterize a thermodynamic system. It is

$$S.dT - V.dp + \Sigma n_i \, d\mu_i = 0$$

(S = entropy, T = absolute temperature, V = volume, p = pressure, μ_i = chemical potential, n_i = number of molecules).

GIBBS ENSEMBLE is a virtual collection of identical macroscopic thermodynamic systems. Each system consists of the same number of constituents (molecules, atoms) in thermal equilibrium with the same surroundings.

GIBBS FUNCTION is defined by the equation

$$G = U - T \cdot S + p \cdot V$$

(U = internal energy, T = absolute temperature, S = entropy, p = pressure, V = volume, G = Gibbs free energy).

Synonyms: Gibbs potential
Gibbs free energy
Thermodynamic potential

GINZBURG-LANDAU THEORY develops a generalization of London's theory for dealing with situations in which the state of the superconductor varies in space.

GOETZ AEROSOL SPECTROMETER measures the size spectra of aerosols. The process employed for precipitating the aerosol particles from the airborne state is based upon the application of high centrifugal forces to a continuous laminar flow of the aerosol along an Archimedian helical spiral channel. Under these conditions the fallout of particles follows Stokes's law.

Synonym: Goetz aerosols

GOLDBERGER MODEL is a nuclear model which considers high-energy nuclear reactions as occuring in two steps: (a) a high-energy particle knocks out one or more nucleans, leaving the residual nucleus in an excited state; (b) this excited nucleus may evaporate other nucleons or emit photons, according to statistical theory.

Synonyms: Goldberger method
Goldberger theory
Serber-Goldberger model

GOLDBERGER-TREIMAN RELATION is an approximate relation between the lifetime of charged pions, the pion-nucleon coupling constant and the axial vector coupling constant in weak interactions. A more general definition: The divergence of the strangeness conserving axial vector current in weak interactions is proportional to the pion field operator.

Synonyms: Goldberger-Treiman formula
Gellmann-Levy relation

GOLDSTONE DIAGRAMS

Synonyms: Goldstone theory
Brueckner-Sawada theory
Brueckner approximation
Brueckner-Goldstone theory
Sawada method

GOUY METHOD is a method of measuring the magnetic susceptibility of substances.

Synonyms: Gouy technique
Gouy balance

GRASHOF NUMBER is a non-dimensional parameter appearing in the theory flows caused by free convection: It is

$$G = \frac{\alpha \vartheta g \ d^3}{\nu^2}$$

where ϑ is the temperature difference producing the convection α is the coefficient of thermal expansion of the fluid, g is the gravitational constant, d is the length scale of the system, ν is the kinematic viscosity. The Grashof number represents the ratio of hydrostatic lifting forces to viscosity forces.

GREEN FUNCTION is the solution of an inhomogeneous differential equation with a given homogeneous part and a point source. The solution of the inhomogeneous equation possessing the same homogeneous part, but an arbitrary source term, may then be expressed by an integral over the Green function and the source function.

GRUENEISEN CONSTANT γ occurs in a relation that connects the linear expansion coefficient β with the compressibility K and the specific heat c_V :

$$\beta = K \gamma c_V / 3V$$

where V is the volume.

Synonym: Grueneisen gamma

GRUENEISEN FORMULA is an empirical formula for the variation of electric resistivity of a very pure metal with temperature.

HALL PROCESS is a process for producing aluminum by electroreduction of aluminum oxides. Corresponding processes are discussed for obtaining uranium from its oxides.

HALL-VINEN THEORY describes the flow of liquid helium II at super-critical velocities. Special assumptions are made on the mutual friction of the two components.

HALPERN-HALL THEORY is a modification of the Bethe-Bloch theory, and describes the energy loss of charged particles in condensed materials due to ionization. The theory takes into account the effects of polarization and conductivity in the medium (density effect).

Synonyms: Hall theory
Hall formula

HALPERN-JOHNSON THEORY describes the scattering of neutrons by magnetic materials.

HALPERN-STRUTINSKI THEORY is a semi-classical theory describing the angular distribution of fission products engendered in induced fission reactions.

HAMILTONIAN FUNCTION is, in classical particle mechanics, a function of n generalized coordinates and momenta q_i and P_i. It is defined by:

$$H = \sum_{i=1}^{n} p_i q_i - L$$

where L is the Lagrangian function.

Synonyms: Hamilton equations
Hamiltonian

HAMILTON EQUATIONS are first-order partial differential equations for the action function

$$S(q_k, dq_k/dt, t)$$

where q_k and dq_k/dt are the generalized coordinates and velocities of the system. The differential equation is

$$\frac{\delta \varrho}{\delta t} + H\left(q_k, \frac{\delta \varrho}{\delta q_k}, t\right) = 0$$

where H is the Hamiltonian function.

HAMILTONIAN OPERATOR corresponds, in non-relativistic quantum mechanics, to the Hamiltonian function in classical mechanics, and in relativistic quantum field theory, is the energy component of the energy momentum vector.

HARTREE-FOCK METHOD is an approximation used to determine wave functions of atoms by the self-consisten field method.

Synonyms: Hartree approximation
Fock equations
Fock self-consistent field
Fock method

HAUSER-FESHBACK THEORY is the statistical theory of nuclear reactions extended by the hypothesis of random phases of the nuclear compound states in the region of overlapping levels.

HEISENBERG FORCE is a phenomenologically postulated central force between two nucleons derivable from a potential containing an operator which exchanges both the spins and positions of the two particles.

HEISENBERG MODEL of ferromagnetism is based on the exchange interaction between electrons in neighboring atoms which depends on the relative orientations of the electronic spins.

HEISENBERG MULTIPLE PRODUCTION treats the production of many mesons in nucleon-nucleon collision as a shock wave problem using a nonlinear wave equation. According to this theory the spectrum of the pions in the cm is $\sim E^{-2}$; mean energy increases logarithmically with primary energy. (for details see: Z.Phys.133, 65 (1952).

HEISENBERG NONLINEAR THEORY is an attempt to construct a model of elementary particles and their interactions by starting with one nonlinear equation for a fundamental spinor field.

HEISENBERG PICTURE is the description of the evolution in time of a quantum-mechanical system by the use of a time-independent state vector and time-dependent operators.

HEITLER-LONDON THEORY is a quantum-mechanical interpretation of chemical bonds formed between neutral atoms by electron-pair bond formation in saturated molecules.

Synonyms: Heitler-London waves
Heitler-London function

HELMHOLTZ COILS are a pair of coaxial coils separated by a distance and carrying a current in the same sense. The field midway along the axis between them is nearly uniform.

HELMHOLTZ INSTABILITY is the hydrodynamic instability arising from a shear in current speed at the boundary between two fluids in relative motion.

HELMHOLTZ THEOREM is the statement that if F is a vector field satisfying certain quite general mathematical conditions, then F is the sum of two vectors, one of which is irrotational, the other solenoidal.

HERSCHEL EFFECT is a photographic effect. It is the destruction of a latent image in a gelatin emulsion.

HERTZSPRUNG-RUSSELL DIAGRAM is a diagram in which each star is represented by a point, the abscissa of which is given by the spectral class, the ordinate by the luminosity as expressed by the absolute magnitude.

Synonym: HR diagram

HILGER SPECTROGRAPH is an optical spectrograph, using a quartz prism, for determining spectral lines of gases.

HILL EQUATION is a differential equation of the form

$$d^2y/dx^2 + f(x)y = 0$$

where $f(x)$ is an even periodic function. This equation was first investigated by Hill in connection with the theory of moon motion. It occurs also in theory of particle orbits in alternating gradient synchrotrons and in the quantum theory of metals.

Synonyms: Hill-Brown method
Hill-Meisner method
Hill determinants

HILL-WHEELER THEORY describes the fission phenomena on the basis of the collective model of the atomic nucleus.

Synonym: Hill-Wheeler integrals

HUGONIOT EQUATION is an equation of state for inhomogeneities which appear when shock waves are propagating. The Hugoniot curve shows the dependence of the ratio of pressure before and behind the wave front on the ratio of the corresponding densities.

Synonym: Hugoniot equation

HURWITZ EFFECT describes the influence on resonance spacing within nuclei by the pairing force between nucleons.

Synonyms: Bethe-Hurwitz factor
Bethe-Hurwitz effect

HUYGENS PRINCIPLE is a well-known method of analysis applied to problems of wave propagation. It recognizes that each point of an advancing wave front is in fact the center of a fresh disturbance, and the source of a new train of waves, and that the advancing waves as a whole may be regarded as the resultant of the secondary waves arising from points in the medium already traversed.

Synonyms: Helmholtz-Huygens principle
Huygens-Mirchhoff principle

HYLLERAAS COORDINATES are a two-particle set of coordinates useful in quantum-mechanical problems of the helium atom, the singly ionized lithium atom, etc.

INHOUR EQUATION is used in the theory of neutron chain reactions; it relates to reactor period, multiplication factor and reactivity.

Synonym: Inhour formula

JACOBI POLYNOMIALS are the solutions of the differential equation

$$x(1-x)y'' + (c-(a+1)x)y' + n(a+n)y = 0$$

with a, c real; $c>0$; $a>(c-1)$; n, an integer.

JAHN-TELLER EFFECT states that if a particular symmetric configuration of non-linear molecule gives rise to an orbitally degenerate ground-state, then this configuration is unstable with respect to another one of lower symmetry which does not give rise to an orbitally degenerate ground-state.

Synonyms: Jahn-Teller distorsions
Jahn-Teller theorem

JOST FUNCTION is a solution of the Schroedinger equation for the scattering problem in potential theory, fulfilling a certain boundary condition at infinity.

Synonym: Jost theorem

KAPITZA RESISTANCE is the temperature discontinuity at the surface if heat flows from a solid into a liquid at low temperature. The thermal impedance thereby is Kapitza resistance.

Synonym: Kapitza boundary effect

KARMAN VORTEX STREET is a henomenon which appears when beyond a critical flow Reynolds number the laminar wake of a long cylinder is unstable and develops into a double row of diffuse vortices, arranged alternatively in two rows.

KEMMER EQUATION is a Lorentz-invariant equation describing particles with spin zero or one.

Synonyms: Kemmer theory
Kemmer-Duffin equation
Duffin-Kemmer algebra
Duffin-Kemmer equation
Duffin-Kemmer field
Duffin-Kemmer formalism
Duffin-Kemmer matrices
Duffin-Kemmer model
Duffin-Kemmer particles
Duffin-Kemmer theory
Duffin-Kemmer-Petiau relations

KERR CELLS are devices to modulate a beam of light by taking advantage of the Kerr effect of a liquid put into a modulated electric field.

Synonym: Kerr shutters

KERR EFFECT is the property of certain liquid dielectrics to rotate the plane of polarization of plane-polarized light passing through them when an electric potential is applied to the liquid. It is also the changing of plane-polarized light to elliptically polarized light when that light is reflected from the surface of an electromagnet pole piece.

KHALATNIKOV-THEORY is a theory on thermodynamical properties of superfluid helium based on the Fermi liquid model.

Synonyms: Khalatnikov-Zharkov theory
Khalatnikov coefficient
Khalatnikov spectrum

KHURI REPRESENTATION is a modification of Regge representation based on Mandelstam representation. It exhibits full crossing symmetry.

Synonym: Khuri series

KIKUCHI LINES are a series of spectral lines obtained by directing an electron stream against the surface of a crystal, due to the scattering of electrons by layers of atoms in the crystal structure.

KING FURNACE is a vacuum furnace device for the excitation of absorption and emission lines of metals.

Synonym: King vacuum furnace

KINK INSTABILITY is, in the thermonuclear program, an observed configuration of gas current which appears as a series of sausages of irregular length. This configuration occurs in the cylindrical dynamic pinch discharge tube and is a specific type of hydrodynamic instability.

KIRCHHOFF RADIATION LAW states that the monochromatic emissivity of a surface at temperature T is equal to its monochromatic absorptivity. It is a consequence of the second law of thermodynamics.

KIRKWOOD METHOD is an approximation used in the kinetic theory of liquids. The force on one molecule of a set of molecules is assumed to be the sum of the forces exerted, neglecting in turn all but one other molecule of the set. In this way an equation may be obtained for the radial distribution function.

Synonyms: Kirkwood approximation
Kirkwood-Bauer-Magat theory
Kirkwood-Salsburg equation

KLEIN-GORDON EQUATION is a relativistic quantum-mechanical wave equation which has to be satisfied necessarily by the wave function of any particle with arbitrary spin.

KLEIN-NISHINA FORMULA is an expression for the differential cross section for scattering of a photon by a point charged spin-1/2 particle possessing a normal magnetic moment.

KNIGHT SHIFT is the change in magnetic flux density or in frequency for nuclear magnetic resonance that results from the magnetic field of the oriented conduction electrons.

KNIPP-UHLENBECK THEORY deals with the most important higher-order process in beta decay which is the simultaneous emission of an electron, a neutrino and a photon, known as internal bremsstrahlung, and neglects the Coulomb effects. Their treatment is restricted to allowed transitions and vector-interaction only.

Synonyms: Knipp-Bloch theory
Knipp-Uhlenbeck method

KNUDSEN EFFUSION is the flow of gas through a long tube at pressures such that the mean free path is much greater than the tube radius.

Synonyms: Knudsen flow
Knudsen formula
Knudsen diffusion
Knudsen gas

KNUDSEN NUMBER is used to describe the flow of a viscous fluid of low density. It is given by the ratio (mean free path/characteristic length of the flow).

Synonyms: Knudsen condition
Knudsen region

KNUDSEN TECHNIQUE is a special method to measure the vapor pressure of metals. For this purpose the rate of effusion of the vapor through a small aperture is measured.

Synonyms: Knudsen cell technique
Knudsen cells
Knudsen effusion cells
Knudsen weight loss method
Knudsen-type effusion vessel

KOEHLER-SEITZ THEORY

Synonym: Seitz model

KOHN EFFECT consists in the appearance of discontinuities in the slopes of the phonon dispersion curves of metals due to effects of the Fermi surface. This effect is interpreted as a screening of the lattice vibrations by the conducting electrons resulting in a singular behavior of the phonon dispersion curve.

Synonyms: Kohn principle
Kohn theory

KONOPINSKI-MAHMOUD MODEL

Synonyms: Konopinski-Mahmoud hypothesis
Konopinski-Mahmoud theory
Uhlenbeck-Konopinski coupling

KOPP-NEUMANN RULE states that the molar specific heat of a solid compound is approximately equal to the sum of the atomic heats of its constituents.

KOSSEL METHOD states that the atoms of a single crystal are excited by electron beams or X-rays to emit fluorescence radiation. This radiation leads to interferences which can be observed by means of a photographic plate. The interference pattern depends only on the ratio of wavelength to distance between reflecting planes. This ratio can be determined very accurately.

Synonyms: Kossel-Van Bergen method
Kossel patterns
Kossel lines

KRAMER EFFECT is the emission of electrons by metal surfaces after machining. This emission is assumed to be generated by exothermic processes at the metal surface. The emitted electrons have energies of about 1eV.

KRAMERS THEOREM states that a pure electrostatic field acting upon a system of an odd number of electrons can never reduce its degeneracy below two. A magnetic field is necessary to lift the Kramers generacy and indeed paramagnetic resonance may be observed between the two levels of such a doublet when a magnetic field is present.

Synonyms: Kramers degeneracy
Kramers doublet
Kramers equation
Kramers theory
Kramers resonance

KROLL PROCESS is a method for producing titanium, hafnium or zirconium on a commercial scale. The metal oxide is chlorinated in the presence of carbon and the resulting chlorides are reduced by magnesium metal. The by-product magnesium chloride is removed in a high vacuum distillation step, and the resulting metal sponge crushed for further use.

Synonym: Kroll sponge

KROLL-RUDERMANN THEOREM states that the T-matrix element for photoproduction of charged particles of mass m is given at threshold in the limit of vanishing m by lower-order renormalized perturbation theory. This result follows from gauge invariance of the theory.

KRONIG-PENNEY MODEL is a one-dimensional periodic potential for which the wave equation of electrons may be solved exactly and shows band structure, thus providing a mathematical model in which certain properties of metals may be verified by rigorous calculations.

Synonyms: Kronig-Penney lattices
Kronig-Penney problem

KUBO FORMULA is a general expression for a linear transport coefficient, e.g.electric conductivity in the framework of the Kubo theory. This theory is a statistical-mechanical theory on irreversible processes in metals, on the basis of the quantum-mechanical theory of electron-phonon interactions. It develops a general scheme for the calculation of electric conductivity, thermal conductivity and so on.

Synonyms: Kubo method
Kubo theory

KUCZINSKI THEORY explains the sintering of metals as a self-diffusing process.

Synonyms: Kuczinski model
Kuczinski equation

KUHN-THOMAS-REICHE SUM RULE is a sum rule for oscillator strengths.

Synonyms: Thomas-Reiche-Kuhn sum rule
Thomas-Kuhn sum rule

LAGRANGE EQUATIONS are the equations of motion for a dynamical system derived from a variational principle. They appear in classical mechanics and in classical as well as quantum field theory.

Synonyms: Lagrange field equations
Lagrange formalism
Euler equations
Euler-Lagrange equations

LAMBERT LAW relates to the emission of radiation in different directions from a radiating surface. It states that the energy emitted in any direction is proportional to the cosin of the angle α which that direction makes with the normal. The law is true only for a perfectly diffusing surface, but it is a good approximation of the behavior of many surfaces in the range $\alpha < 70°$.

LAMB SHIFT is the displacement between the $2S_{1/2}$ and $2P_{1/2}$ energy levels of hydrogen. In the absence of radiative corrections it is zero due to the Coulomb generacy.

Synonym: Lamb-Rutherford shift

LAMB THEORY is a theory about recoilless resonance absorption and resonance emission of slow neutrons in crystals.

LAMB WAVES is a theory predicting that plates may vibrate up to an infinite number of modes.

LANCZOS METHOD is a method of forming sequantially the columns of matrices B and C such that B^TC is diagonal and, for a given matrix A :

$$AB = T, \quad A^TC = CT$$

where T is a tridiagonal matrix.

LANDE FACTOR appears in the formula for the shift of an atomic energy level in an external magnetic field.

Synonyms: Lande G-factor
Lande interval factor
Lande splitting factor

LANE-THOMAS-WIGNER MODEL is a model of nuclear reaction mechanisms based on the picture that the true nuclear states are somehow intermediate betweeen states of an independent particle model (i.e. states determined by the real part of an optical potential) and compound nuclear states. (For details see: Phys.Rev.98, 693 (1955).

Synonym: Lane-Thomas-Wigner formalism

LANGEVIN THEORY is a theory of diamagnetism which considers the orbital motion of an electron in an atom to be an equivalent current loop. Application of a magnetic field increases the magnetic moment of this current loop according to he usual rules of electrodynamics.

Synonym: Langevin theory of diamagnetism

LANGMUIR FREQUENCY is the oscillator frequency of plasma electrons about an equilibrium charge distribution, called also plasma frequency.

Synonym: Plasma frequency

LANGMUIR ISOTHERM is the following relation between the amount of gas X adsorbed in a unimolecular layer by a definite mass of adsorbent m, and its pressure p:

$$\frac{p}{X/m} = \frac{1}{K_1 K_2} + \frac{p}{K_2}$$

where K_1 and K_2 are constants.

Synonym: Langmuir adscrption equation

LANGMUIR PROBES are small probes in the form of disks, together with thin wires or small spheres of platinum or other materials, with high work function which are introduced into the plasma for determining electron temperature and charge concentration in a plasma. The method of measurement consists in observing the currents drawn to the probe as its potential is varied.

LAPOINTE PICKER is a device for the sorting of radioactive ores. Geiger-Mueller counters or scintillation counters are used as detector elements, and active ore may be removed by a solenoid-operated plunger or a selector gate.

Synonyms: Lapointe ore sorter
Lapointe picker belt

LARMOR PRECESSION is the precession of a magnetic moment caused by interaction with an external magnetic field.

Synonyms: Larmor nuclear precession
Larmor frequency

LARMOR RADIUS is the radius of curvature of a charged particle moving in a uniform magnetic field.

Synonyms: Larmor electrons
Gyromagnetic radius

LAURITSEN ELECTROSCOPE is a type of radiation detector for measuring ionizing radiations.

LEE-YANG THEORY

Synonyms: Yang-Tiommo theory
Yang-Lee distribution

LENNARD-JONES POTENTIAL is one of the different ways for describing the potential energy of two atoms within a diatomic molecule. It is the Lennard-Jones 12-6 potential:

$$U(r) = A\, r^{-12} - B\, r^{-6}$$

LENNARD-JONES THEORY is a theory of the liquid state. It describes fusion as a dissociation of the crystal lattice molecules moving from the lattice sites to interlattice holes.

Synonym: Lennard-Jones-Devonshire theory

LESBESGUE MEASURE is an important type of the many concepts for defining an integral. One considers the sums:

$$s = \Sigma y_{i-1} \mu_i \qquad S = \Sigma y_i \mu_i$$

where μ_i is the measure of the set E_i of points x the function $f(x)$ assumes values between y_{i-1} and y. If all the sets E_i are measurable, then the upper bound of the sums s is called the Lesbesgue integral of $f(x)$.

Synonym: Lesbesgue integral

LEVINSON-BANNERJEE THEORY relates the difference between the phase shift at zero and infinite energy to the number of bound states in the formal scattering theory.

Synonym: Levinson-Jauch theorem

LIOUVILLE THEOREM is a theorem in statistical mechanics. It states that all elements of equal volume in phase have equal "a priori" probabilities. This statement is also known as the ergodic hypothesis.

Synonym: Ergodic hypothesis

LIPPMAN-SCHWINGER EQUATION is an equation obtained in rewriting the quantum-mechanical Schroedinger equation for scattering processes into an integral equation.

LONDON EQUATION is a modification of the equations of electrodynamics to describe the phenomena of superconductivity.

Synonyms: London theory
London dispersion forces
London-Van-der-Waals forces

LORENTZ FIELD is a fictitious field introduced into the theory of dielectric and magnetic polarization in order to find the actual local field acting on the molecules. It is defined as the field produced inside a spherical cavity in a uniform polarized medium.

LORENTZ FORCE acts on an electric charge (e.g. on a charged particle) moving in electric and magnetic fields (E,and, respectively, B) with velocity v. It is given by:

$$K = Ze\ (E + \frac{1}{c}[v,\ B])$$

where Ze is the charge of the particle and c is the velocity of light.

LORENTZ GAS is an idealized model of a fully ionized gas in which all electron-electron interactions are neglected and the ions are assumed to be stationary.

Synonym: Lorentz plasma

LORENTZ GAUGE leads to a simple form of Maxwell equations written in terms of the four-vector potential A by a choice of the potential which satisfies the Lorentz condition

$$\sum_{\mu} \frac{\delta A_{\mu}}{\delta x_{\mu}} = 0 \quad (\mathrm{div}A + \frac{1}{c}\ \frac{\delta \varphi}{\delta t} = 0)$$

Classical electrodynamics are invariant against gauge transformations of the four-vector potential A_{μ}.

LORENTZ TRANSFORMATIONS is an element of the inhomogeneous Lorentz group which consists of three parts:
(1) translations in space and time;
(2) the homogeneous Lorentz group without reflections,i.e. the special Lorentz transformations and the three-dimensional rotations;
(3) space and time reflections.

LORENTZ NUMBER is the multiplying factor of the ratio of thermal to electric conductivity for a metal proportional to its absolute temperature.

LYMAN LINES are a group of spectral lines in the ultraviolet region emitted by atomic hydrogen.

Synonyms: Lyman series
Lyman alpha radiation
Lyman continuum
Lyman glow
Lyman alpha emission

MACH NUMBER is defined as the ratio of the speed of an object to the speed of sound in the undisturbed medium in which the object is travelling.

Synonyms: Mach angle
Mach cone
Mach range
Mach reflections
Mach stems
Mach tail

MACH PRINCIPLE is of fundamental significance in physics. It states that the inertia of any system arises from the interaction between the system and the rest of the universes, including distant parts thereof. If follows from applying the Mach criterion to the concept of absolute space.

MACH-ZEHNDER INTERFEROMETER is a device for making exact measurements of variations in the refractive index (i.e. density distribution in a gas flow may be determined in this way).

MADELUNG CONSTANT is a constant which appears either in the term for the Coulomb energy of an ionic crystal or in the expression of the wavelength of the residual radiation selectively reflected by a given heteropolar crystal.

MAJORANA FOCE is that part of the nucleon-nucleon potential which interchanges the coordinates of the two nucleons.

Synonyms: Majorana interaction
Majorana operator

MAJORANA NEUTRINO is a neutrino which is identical with its antiparticle so that double beta decay could occur without the emission of neutrinos.

MANDELSTAM REPRESENTATION is a postulated double dispersion relation for transition amplitudes in elementary particle interactions with two particles in the initial, and, resp., in the final state. According to the MANDELSTAM REPRESENTATION the transition amplitude is an analytic function in the direct product of the cut complex energy and momentum-transfer planes. The singularities in the energy and, resp., momentum-transfer variable are given by the physically possible intermediate states in the corresponding channel.

MARKOV PROCESS is a stochastic process of a simple kind. The distribution of future states depends only on the present state and not on previous history.

Synonym: Markov chains

MARSHAK BOUNDARY CONDITIONS are boundary conditions used in transport theory in the analysis of the Milne problem.

Synonym: Marshak conditions

MATHIEU EQUATION is a differential equation resulting from the separation, in elliptical cylindrical coordinates, of partial differential equations like LAPLACE's or the wave question. The solutions are the MATHIEU FUNCTIONS.

Synonym: Mathieu functions

MAXWELL EQUATIONS are four differential equations describing electrodynamics.

MAXWELL STRESS-TENSOR describes the force of the electromagnetic field to a volume element.

MC LEOD GAUGE is an absolute measuring device for the pressure range from 10^{-6} to about 1 mm Hg. It is generally used to calibrate other types of gauge.

MEISSNER-OCHSENFELD EFFECT is a phenomen on superconductivity. If a superconductor is brought into a magnetic field at room temperature and then cooled below the superconducting transition temperature, the magnetic field strength outside the metal changes abruptly because the specimen expels the field.

Synonym: Meissner effect

MELLIN TRANSFORM $f(y)$ and its inverse $F(x)$ are defined, subject to certain conditions, by the relations

$$f(y) = \int_0^\infty x^{y-1} F(x)\, dx$$

$$F(x) = 1/2\, i \int_{C-i\infty}^{C+i\infty} x^{-y} f(y)\, dy$$

MIE-GRUENEISEN EQUATION is an approximate equation of state for crystals and brings pressure, volume, and total energy into relation.

MIE SCATTERING is any scattering produced by spherical particles without special regard to comparative size of radiation wavelength and particle diameter.

MILNE PROBLEM is the problem of finding the distribution, in space and angle, of neutrons in a himogeneous source-free medium filling the half-space $x < 0$. The particles are assumed to originate at $x = -\infty$ and do not undergo a change in energy upon scattering.

MINKOWSKI SPACE is a flat space of four dimensions of which three specify the position of a point in space and the fourth dimension represents the time at which an event occurs at that point. The metric of this world is given by the four-dimensional distance formula

$$s^2 = x^2 + y^2 + z^2 + (ict)^2$$

Synonym: Minkowski metric

MOELLER SCATTERING describes the scattering of electrons by electrons. The matrix element is derived without averaging over the spin directions of incident and struck electrons.

MOESSBAUER EFFECT is an effect in nuclear resonance fluorescence. It is the experimental discovery of recoilless emission and absorption of some gamma-emitting nuclides in solids at relatively low temperature.

MOLIERE THEORY is a theory about the multiple scattering of charged particles.

MOLLIER DIAGRAM is a thermodynamic diagram for a homogeneous system (vapors) possessing two independent properties, in which enthalpy is the ordinate and entropy is the abscissa.

Synonym: Mollier chart

MORSE POTENTIAL is an equation relating the potential energy of a diatomic molecule to the internuclear distance.

Synonyms: Morse equation
Morse curve
Morse function

MOSELEY LAW describes the relation between the wave numbers of corresponding spectral lines in the X-ray region and the atomic number Z.

NERNST EFFECT is a coefficient (Q) which enters in the Nernst formula which governs the production of an electric field when the conductor is subjected to a temperature gradient in the presence of a field of magnetic flux density

$$E = Q\left[\nabla T, B\right]$$

NERNST HEAT THEOREM states that for a homogeneous system the rate of change of the free energy with temperature, as well as the rate of change of heat content with temperature, approaches zero as the temperature approaches zero.

Synonyms: Third law of thermodynamics
Nernst-Lindemann equation

NILSSON-MOTTELSON MODEL assumes that the nucleus has a tightly bound core which behaves according to the independent particle model and that this core is surrounded by a layer in which some interaction takes place between the individual particles (collective motion). The collective deformation of many orbits leads to a quadruple amount.

Synonyms: Nilsson formula
Nilsson scheme
Nilsson theory
Nilsson potential
Nilsson configuration
Nilsson model
Bohr-Mottelson model
Bohr-Mottelson theory
Bohr-Mottelson scheme
Mottelson-Nilsson model

NUSSELT NUMBER is the heat transfer from a solid body to a fluid expressed in terms of the dimensionless Nusselt number.

Synonyms: Nusselt modulus
Nusselt theory
Nusselt equation

OKUBO MASS FORMULA is a formula for the mass of strong interacting particles based on the hypothesis of the invariance of the interaction with respect to newly introduced quantum numbers (U-spin, V-spin) in the theory of strange particles.

Synonym: Gell-Mann-Okubo mass formula

ONSAGER EQUATION is an equation expressing the relation between the measured equivalent conductance at a particular concentration and that at infinite dilution.

ONSAGER RELATIONS considers entropy S as a function of some macroscopic quantities a_i which tend towards their equilibrium values in an irreversible manner. For small variations around the equilibrium state, the linear relations

$$\dot{a}_j = \sum_k A_{jk} \frac{\partial S}{\partial a_k}$$

are obtained, where the coefficients A_{jk} satisfy the Onsager symmetry relations

$$A_{jk} = A_{kj}$$

Synonyms: Onsager symmetry relations
Reciprocity relation
Onsager principle

ONSAGER THEORY gives a relation for the dielectric constant of a pure liquid if the short-range interactions in a dielectric can be neglected and if the polarizability of the dipolar molecules is isotropic.

OPPENHEIMER-PHILLIPS PROCESS is a special mechanism of (d,p) stripping for bombarding energies below the Coulomb barrier. Thereby the incoming deuteron dissociates in the Coulomb field of the target nucleus followed by capture of the neutron.

OPTICAL MODEL is the FESHBACH-PORTER-WEISSKOPF model. The average cross sections for nucleon-nucleus collisions are calculated by means of an effective complex one-particle potential (optical potential). The model may be understood as an application of the shell model idea to nuclear reactions. It is an improvement on the Feschbach-Weisskopf model. (For details see: Phys.Rev.96, 448 (1954).

Synonym: Feschbach-Porter-Weisskopf model

PAIS MODEL is a model for non-leptonic weak interactions, based on the doublet approximation (DA).

Synonyms: Pais-Picconi model
Pais scheme

PATTERSON METHOD is a technique of X-ray analysis of crystal structures, based upon the fact that the square of the structure factor f(hkl) is a mesure of the reflecting power of the corresponding plane and can be transformed to give a vectorial representation of the interatomic distances in the crystal (Patterson diagram).

Synonyms: Patterson sections
Patterson projections
Patterson diagrams
Patterson function
Patterson synthesis

PEIERLS METHOD is a boundary condition model for nuclear reactions. The eigenfunctions of the Hamiltonian inside the finite interaction volume in configuration space describes the states of the compound nuclei.

Synonyms: Kapur-Peierls method
Wigner-Eisenbud method
R-matrix theory
Wigner theory

PEIERLS-NABARRO FORCE is the force necessary to move a dislocation along its slip plane, believed to be very much less than the observed shear strength of the softest crystal.

Synonyms: Peierls-Nabarro effect
Peierls-Nabarro stresses
Peierls stress
Peierls force
Nabarro-Herring equation

PENNING EFFECT is an ionization effect in gas discharges occurring in collisions between metastable atoms and atoms of a different element which have an ionization potential less than the potential corresponding to the metastable state.

Synonyms: Penning ion source
Penning discharges

PHILIPS GAUGE is an electron tube which consists of a double plate cathode and a single ring anode placed between the cathode plates, the whole being oriented in a magnetic field. A glow discharge can be maintained at very low pressure. The discharge current is a measure of pressure.

Synonyms: Philips ion gauge
Philips ionization gauge

PINES-BOHM THEORY is a technique for allowing Coulomb interactions between the conduction electrons in a metal. It is shown that the gas of electrons behaves as a plasma, having characteristic vibrations of long wavelength but nearly constant frequency, while the interactions between individual electrons are shielded out at all but short distances.

Synonyms: Bohm-Pines approximation
Bohm-Pines method

PLACZEC FUNCTION describes the slowing down of neutrons in large, homogeneous systems. The function depends on the atomic mass of the scattering material.

Synonym: Bethe-Placzec model

PLANCK LAW is the fundamental law of the quantum theory of radiation, expressing the essential concept that energy transfers associated with radiations, such as light or X-rays, are made of definite quanta or increments of energy proportional to the frequency of the corresponding radiation. The law is expressed as:

$$E = h\nu$$

Synonym: Planck constant

PLASMA DIAMAGNETISM is the diamagnetic effect exhibited by a plasma in a magnetic field as a result of the Larmor motion of charged particles in the magnetic field.

Synonym: Larmor plasma

PRANDTL NUMBER is equal to the product of the specific heat at constant pressure and the kinematic viscosity of a fluid divided by its thermal conductivity.

PRIGOGINE THEOREM is a theorem of thermodynamics of irreversible processes. It states that the entropy production decreases with time and is a minimum in stationary states. It gives a variational principle for non-equilibrium stationary states.

Synonyms: Van Hove-Prigogine theory
Prigogine theory
Balescu theory

PRIMAKOFF EFFECT is the photoproduction of (single) neutral pions (or η°) in the Coulomb field of a nucleus. Primakoff first calculated the cross section of this process, considering it as the inverse reaction of neutral pion-two photon decay.

PRIMAKOFF THEORY deals with the capture of muons-minus by nuclei on the basis of the universal Fermi interaction.

Synonyms: Primakoff coupling constant
Primakoff formula

REYNOLDS NUMBER dimentionless, represents the rate of inertial reaction to viscous force.

Synonyms: Reynolds modulus
Reynoldsstresses
Reynolds equations

RICHTMYER-TELLER THEORY states that all cosmic radiation observed on earth is produced at some time in the surroundings of the sun, and a magnetic field prevents the particles from escaping out of this area.

RIEMANN FUNCTION plays an essential part in the solution of the Cauchy problem for hyperbolic differential equations.

Synonyms: Riemann invariants
Riemann waves

RIEMANN SHEET is introduced for the representation of multivalued functions of the complex variable. One sheet is assigned to each branch of the function. The whole system of Riemann sheets of a function is called Riemann surface.

Synonym: Riemann surface

RIEMANN SPACE is an n-dimensional space of non-zero curvature.

Synonyms: Riemann manifolds
Riemann sphere
Riemann geometry
Riemann metric
Riemann curvature tensor
Riemann-Christoffel tensor

RITZ COMBINATION PRINCIPLE finds empirically that the frequencies of light emitted by atoms can be expressed as differences of "terms".

RITZ METHOD or Ritz variation method, is a method for the practical calculation of energy eigenvalues in quantum-mechanical systems. It is based on the fact that the problem of solving the equation

$$Hu = lu$$

is equivalent to the task of finding the minimum of (u,Hu) under the condition $(u,u) = 1$.

Synonyms: Ritz variation method
Ritz-Rayleigh method

ROCKWELL HARDNESS test uses a diamond cone with rounded pack, or steel sphere, as indentation bodies.

Synonyms: Rockwell A scale
Rockwell C scale
Rockwell indentation test

ROSENBLUM COUNTERS are spark counters (consisting of an anode which is a thin (0.1 mm diameter) wire stretched parallel to and at a distance of a few millimeters from a flat metal plate which is sensible only to heavily ionizing particles such as alpha particles and fission fragments.

Synonym: Rosenblum spark counters

ROSSI ALPHA METHOD is used to measure prompt neutron lifetime in fast and thermal reactor assemblies. After a burst of neutrons from an external source, statistical observations are made of the neutron population while the reactor is subcritical or delayed-critical. The population of prompt neutrons decays as $\exp(-\alpha t)$, where alpha is the reciprocal of the prompt reactor period.

Synonyms: Rossi method
Rossi time

ROSSI CURVE is the dependance of the shower rate on absorber thickness in condensed absorbers, where there is a transition effect of cosmic ray shower rate.

Synonyms: Rossi effects
Rossi showers
Rossi maximum

RUTHERFORD SCATTERING is the elastic scattering of charged particles with zero spin by the Coulomb field of a point source.

Synonyms: Rutherford-Mott formula
Rutherford formula

SACHS-TELLER MASS

Synonym: Sachs-Teller theory

SACHS-TREIMAN METHOD is a method to observe the mass difference between the short-and the long-lived components of neutral kaons by measuring the time distribution of the leptonic decay mode. The oscillatory behavior in time of the interference of the two components determines their mass difference.

SAHA EQUATION is a formula for the relative concentrations c_i, c_e and c_a of single-ionized ions, electrons and neutral atoms in a gas as a function of temperature:

$$\frac{c_i\, c_e}{c_a} = \frac{2\pi\, mkT}{h^2}^{3/2} \frac{2g_i}{g_a} \exp -(P/kt)$$

where m is the electron mass, k is the Bolzmann constant, h is the Planck constant, t is absolute temperature, P is the ionization potential and g_i and g_a are the statistical weights of the ground state of the ions and the atoms. A similar equation, also called the SAHA EQUATION, holds for the dissociation of molecules.

Synonym: Saha equilibrium

SAHA-LANGMUIR EQUATION is the corresponding relation between the temperature dependence of ionization related to the difference between the ionization potential of the impinging atom and the work function of the surface under consideration, this according to the SAHA-LANGMUIR THEORY of surface ionization.

Synonym: Saha-Langmuir theory

SCHMITT TRIGGER CIRCUIT is a modified bi-stable multivibrator which is widely used as a voltage discriminator or a "squaring circuit".

SCHOTTKY DEFECTS are lattive vacancies created by removing an ion from its site and placing it on the surface of the crystal.

SCHOTTKY EFFECTS is the reduction of the work function of thermionic emitter by the application of an accelerating field at the emitter's surface.

SCHOTTKY THEORY is a theory dealing with the rectification properties of the contact between a metal and a semiconductor, which depends on the formation of a barrier layer on the contact surface.

SCHROEDINGER EQUATION is the basic equation of quantum mechanics. It is developed by using the DE BROGLIE WAVELENGTH in the description of particle and then associating with energy E or momentum p of the particle, a differential operator

$$E = i\hbar \frac{\delta}{\delta t} \qquad \vec{p} = i \hbar \, \mathrm{grad}$$

Writing these differential operators in the HAMILTONIAN function, one obtains:

$$-\frac{\hbar^2}{2m} \Delta \psi + V(r)\psi = E \psi$$

Synonyms: Schroedinger picture
Schroedinger representation

SCHUMANN-RUNGE BANDS are a system of ultraviolet absorption bands for molecular oxygen.

SCHWINGER ACTION PRINCIPLE is a general theory of quantum field dynamics based on a fundamental dynamical principle, stated as a variational equation for the transformation function connecting eigenvectors at different space-like surfaces, which the temporal development of the system. The generator of the infinitesimal transformation is the variation of the action integral operator, the space-time volume integral of the invariant Lagrange function operator. This action principle considers only systems with a local Lagrangian function.

Synonyms: Schwinger dynamic principle
Schwinger variational principle

SCHWINGER FUNCTIONAL EQUATIONS are functional-differential equations for the Green functions in quantized field theory. They are derived by starting with the field equation including external sources.

Synonym: Schwinger functional method

SCHWINGER-TOMONAGA FORMALISM independently develops a covariant formulation of quantum electrodynamics. The foundations and the applications of the theory were simplified and the divergence difficulties partially overcome. Dyson further simplified the applications, carried the theory further on and demonstrated its equivalence with the radiation theory of Feynman.

Synonyms: Schwinger-Tomonaga Theory
Schwinger-Tomonaga Dyson theory
Tomonaga-Schwinger theory
Tomonaga-Schwinger formalism
Tomonaga-Schwinger equation

SCHWINGER VARIATIONAL METHOD is a variational method (based on the Lippman-Schwinger equation) for calculating scattering phase shifts in terms of trial scattering wave functions. It has the advantage of being independent of the normalization of the trial function.

SERBER THEORY describes the stripping phenomenon at high energy semi-classically by considering one of the nucleons (e.g. the proton in the deuteron) as absorbed by a nucleus and the other as continuing along its trajectory almost undisturbed with the initial velocity of the deuteron, and hence, half its energy.

Synonyms: Serber model
Serber interactions

SERBER-WILSON METHOD is, in neutron transport theory, a method for improving the diffusion approximation by improving the conditions used to select appropriate solutions.

SHOCKLEY-READ THEORY is a model theory describing the recombination of carriers (electrons and holes) in a semiconductor assuming a single dominating recombination niveau for the recombination centers.

Synonyms: Hall-Shockley-Read theory
Hall-Shockleyr-Read level
Shockley-Read capture cross section
Shockley-Read equation

SHOCKLEY SURFACE STATES are energy states in Shockley's theory of electronic structure of the surface of an ideal crystal.

Synonym: Shockley theory

SIEVERT APPARATUS is used for measuring the absorption of gases by metals as a function of gas pressure and temperature.

Synonym: Sievert technique

SIEVERT LAW is a law according to which the solubility of gases in metals varies as the square root of gas pressure.

SIGNELL-MARSHAK POTENTIAL is a semiphenomenological nucleon-nucleon potential. To the field-theoretical Gartenhaus potential (second + fourth order perturbation theory in the static Chew-Low theory) a phenomenological spin-orbit potential has been added.

SNOWPLOW MODEL assumes that the plasma in a discharge tube is infinitely conducting, so that current begins to flow in a thin layer of the plasma adjacent to the walls when the tube is connected to a capacitor bank. The flow of current in the plasma sheath sets up an azimuthal magnetic field just outside the current layer. Since there is no field on the inside, the sheath begins to contract, behaving like a magnetic piston and sweeping up all charged particles it encounters.

Synonym: Rosenbluth-Garwin model

SOMMERFELD CONSTANT is a dimensionless coefficient with which the grouping of closely spaced emission lines in the spectrum of one-electron atoms can be related to the precession of elliptic electron orbits.

Synonym: Sommerfeld fine structure constant

SOMMERFELD-WATSON THEORY

Synonyms: Sommerfeld-Watson approximation
Sommerfeld-Watson representation
Sommerfeld-Watson transformation
Watson theory
Watson method

STERN-GERLACH EXPERIMENT is an experimental test performed by O. Stern and W. Gerlach in 1924 on the quantization of magnetic moments of atoms. A beam of atoms is splitt into $2J + 1$ different streams using a strong magnetic field perpendicular to the atom stream with a strong gradient.

STERNHEIMER FORMULA describes the deformation of the atomic electron shell caused by its interaction with the nuclear quadruple moment.

SZILARD-CHALMERS REACTION shows that after the neutron irradiation of ethyl iodide most of the iodine activity formed could be extracted from the ethyl iodide with water: the iodine-carbon bond was broken when the I^{127} nucleus was transformed by neutron capture to I_{128}. This type of reaction has since been used to concentrate the products of a number of (n,γ)-reactions and of some (γ,n), $(n,2n)$- and (d,p)-reactions.

Synonyms: Szilard-Chalmers process
Szilard-Chalmers effect
Szilard-Chalmers method

TELLER-REDLICH RULE is a rule for isotope effects in molecular spectra. For two isotopic polyatomic molecules the frequencies for all vibrations of a given symmetry are independent of the potential constants and depend only on the masses of the atoms and the geometrical structure of the molecule.

THOMAS-FERMI MODEL is a method for the calculation of atomic energy levels based on a statistical treatment of the assembly of electrons.

Synonyms: Thomas-Fermi differential equation
Fermi differential equation
Fermi-Thomas approximation
Fermi-Thomas atom
Fermi-Thomas field
Fermi-Thomas formula
Fermi-Thomas method
Fermi-Thomas theory

THOMSON EFFECT is one of the thermoelectric effects. When an electric current I passes between two points of a homogeneous wire whose temperature difference is ΔT an amount of heat $\sigma I \Delta T$ is emitted or absorbed, in addition to the Joule heat: σ is the Thomson coefficient.

Synonym: Thomson coefficient

THOMSON PRINCIPLE is the hypothesis that, if thermodynamically reversible and irreversible processes take place simultaneously in a system, the laws of thermodynamics may be applied to the reversible process while ignoring for this purpose the creation of entropy due to the irreversible process.

THOMSON RELATIONS are equations governing thermoelectricity, deduced originally by thermodynamics.

THOMSON SCATTERING is a classical interpretation of the scattering of electromagnetic radiation by free electrons. It applies well to X-rays because energy must be lower than $m_e c^2$.

Synonym: Thomson cross section

TOMONAGA APPROXIMATION consists in a variation technique based on the physical assumption that successive virtual quanta (mesons or photons) in the field around the source particle (nucleon or electron) are emitted independently. The number of quanta in the field around the source is not limited.

Synonym: Intermediate coupling approximation

TOMWNSEND DISCHARGE is a gas discharge. If an ion is accelerated in a gas by an electric field it produces new ions by collision, and the new and original ions produce still other by further collisions. This is resulting finally in the Townsend avalanche. The number of ions formed in each centimeter of drift is called Townsend coefficient.

Synonyms: Townsend avalanche
Townsend coefficient
Townsend ionization
Townsend method
Townsend formula
Townsend theory
Townsend cascade

TREIMAN-YANG TEST is a method for testing the dominance of the one-pion-exchange mechanism in elementary particle reactions. This test is independent of any structure effects in the transition amplitude caused by the virtual nature of the intermediate pion.

Synonym: Treiman-Yang angle

VAN DER WAALS FORCES are interactomic or intermolecular forces of attraction due to the interaction between fluctuating dipole moments associated with molecules not possessing permanent dipole moments.

Synonyms: Van der Waals interaction
Van der Waals energy
Van der Waals constant

VAN HOVE-HUGENHOLTZ THEORY

Synonym: Hugenholz-Pines theory

VAN HOVE THEORY treats the scattering of slow neutrons. The cross section for scattering is related to a space-time correlation function for the scatterer.

Synonyms: Van Hove formalism
Van Hove function
Van Hove singularities

VAN VLECK POTENTIAL is the corresponding potential of a non-local interaction between a nucleon and its neighbors in nuclear matter of a statistical nuclear model with exchange forces.

VAN VLECK THEORY is the quantum theory of paramagnetism.

Synonyms: Van Vleck equation
Van Vleck formula
Van Vleck-Weisskopf formula

VEGARD LAW represents the lattice constant of an alloy as a function of composition.

Synonym: Vegard rule

VERDET CONSTANT is a proportionality factor in the equation describing the Faraday effect.

WAGNER THEORY

Synonyms: Wagner-Hauffe theory
Wagner-Meerwein reaction

WEISSENBERG METHOD is an experimental technique for the X-ray analysis of crystals by which, while the crystal is rotated in the beam of X-rays, the photographic plate is moved parallel to the axis of rotation.

Synonyms: Weissenberg camera
Weissenberg patterns
Weissenberg study
Weissenberg technique

WEISS THEORY is a theory of ferromagnetism based on an ensemble of independent molecular magnets, where each moment is subject to the aligning effect of magnetizing force and to the disorienting effect of thermal agitation.

Synonyms: Weiss field
Weiss region
Weiss field theory

WEIZSAECKER FORMULA is a semi-empirical relation for the atomic mass of a nucleus using the liquid drop model.

Synonyms: Bethe-Weizsaecker formula
Bethe-Weizsaecker equation
Bethe-Weizsaecker relation
Weizsaecker-Fermi formula

WENTZEL MODEL is a static model in field theory. The interaction Hamiltonian is quadratic in the nucleon and meson fields.

Synonym: Wentzel pair model

WHEATSTONE BRIDGE is a four-arm resistive bridge used for measuring electrical impedances.

WHITTAKER FUNCTIONS is the solution of the WITTAKER DIFFERENTIAL EQUATION, which is a second-order equation of the form

$$y'' + \left(\frac{1/4-m^2}{x^2} + \frac{k}{x} - \frac{1}{4} \right) y = 0$$

with singular points at 0 and ∞.

Synonym: Whittaker differential equation

WICK-CHANDRASEKHAR METHOD is, in neutron transport theory, a method of analyzing the transport equation whereby the integral term describing scattering is replaced by a formula of numerical integration.

Synonym: Chandrasekhar-Wick method

WICK METHOD is one of the effective analytical methods in the theory of the slowing down of neutrons at large distances from a source.

WIDMANNSTAETTEN STRUCTURE is a structure in metallurgy in which a geometrical metallographic pattern is produced by the generation of a new phase within the body of the parent phase. The shape of the particles of the new phase and their crystallographic orientations are related to the orientation of the parent crystal.

WIEDEMANN-FRANZ LAW states that the ratio of thermal to electric conductivity for a metal is proportional to absolute temperature. The multiplying factor is called the Lorenz number.

Synonyms: Wiedemann-Franz ratio
Wiedemann-Franz relation
Wiedemann-Franz Lorenz relation

WIELANDT METHOD is a method for the calculation of the roots in the matrix of eigenvalue problem in reactor design.

WIEN EFFECT is the change of electric onductivity of electrolytes on applying high electric fields.

WIEN LAWS describe thermal radiation from a black body.
1. Wien displacement law: the wavelength corresponding to the maximum of the energy distribution curve is inversely proportional to the absolute temperature.
2. The emissive power at the maximum intensity wavelength is proportional to the fifth of the absolute temperature.
3. The Wien radiation law in an empirical rule for the spectral energy distribution as a function of temperature. It fails at long wavelengths.

Synonyms: Wien displacement law
Wien radiation law

WIENER-HOPF METHOD is a method for solving a certain class of linear homogeneous integral equations.

WIENER INTEGRALS are integrals over the space of continuous functions, i.e. Wiener Integrals are a class of functional integrals. They are sometimes useful in dealing with differential and integral equations.

WIGHTMAN FIELD THEORY is an axiomatic approach to quantum field theory, based on Wightman's result that a theory is uniquely determined by the vacuum expectation values of products of field operators (Wightman functions).

Synonyms: Wightman construction
Wightman formulation
Wightman functions
Wightman field

WIGNER DISTRIBUTION

Synonym: Wigner distribution function

WIGNER EFFECT is an effect according to which the properties of graphite are affected by irradiation in a nuclear reactor. The fission fragments can give rise to large energy storage in the graphite.

Synonyms: Wigner distortion
Wigner energy
Wigner energy release

WIGNER-EISENBUD THEORY is a formal dispersion theory of nuclear reactions based on a many-level formula giving the energy dependence of the nuclear cross sections explicitly in terms of energy-independent parameters of the compound nucleus. This formula is a good approximation in the resonance region where the compound states are well separated compared to their widths.

Synonyms: Wigner-Eisenbud formula
Wigner-Teichmann theory

WIGNER FORCE is a short-range force of non-exchange type postulated phenomenologically as part of the interaction between nucleons. It is derivable from a potential determined entirely by the distance between the two particles.

WIGNER SCATTERING

Synonyms: Wigner cup
Wigner scattering matrix

WIGNER-SEITZ METHOD is a technique for calculating the band structure of a metal. Each ion is supposed to be surrounded by a sphere containing one atomic volume, and a wave function is computed so that its gradient is zero at the surface of the sphere.

WIGNER-WILKINS MODEL is a theory concerning the thermalization of neutrons in a thermally agitated gas of hydrogen atoms.

WILKINS EQUATION describes the thermalization process of a neutron flux for the case of moderation by a monoatomic heavy gas of hard spheres.

WILKINSON THEORY describes the nuclear photoeffect (γ, N) using the shell model of atomic nucleus.

Synonym: Wilkinson model

WILLIAMS-WEIZSAECKER METHOD is a method of computing bremtstrahlung emitted in the interaction of a fast charged particle with nuclei. The electromagnetic field of the charged particle is equivalent to a set of virtual photons obtained by a Fourier analysis.

Synonym: Williams-Weizsaecker theory

WINKLER METHOD is a method for the determination of dissociated oxygen in water. This method is frequently used for determination of the oxygen in reactor coolants.

WINLO PROCESS is a chemical process for conversion of uranium scrap materials to UF_4 using a liquid extraction process.

WKB APPROXIMATION is a semiclassical approximation for scattering problems in quantum mechanics.

Synonym: Wentzel-Kramers-Brillouin approximation

WOLFENSTEIN PARAMETERS describe the different possible polarization experiments for nucleon-nucleon elastic scattering. They may be expressed by the elements of the most general scattering matrix allowed by invariance principles.

Synonyms: Wolfenstein matrix
Wolfenstein-Ashkin method

WOODS-SAXON POTENTIAL is a phenomenological expression for the real part of the optical potential describing the interaction between nucleons and nuclei in case of elastic scattering.

YANG-MILLS THEORY treats isospin conservation (or conservation lawsin higher symmetry schemes) in analogy to charge conservation in electrodynamics. Isospin conservation follows from invariance with respect to local gage transformations which generate a vector meson field (B-field).

YANG THEOREM states that if only incoming waves of orbital angular momentum L contribute appreciably to nuclear reactions, the angular distribution of the outgoing particles in the center-of-mass system is an even polynomial of cosine of the angle with maximum exponent not higher than 2L.

YOUNG DIAGRAM characterizes an irreducible representation of the permutation group.

YOUNG MODULUS is the ratio of the tensile force per unit cross-sectional area (stress) to the extension per unit length for simple extension (strain) in a longitudinal direction, in a rod of isotopic material.

YUKAWA COUPLING is any trilinear coupling in field theory which is linear in the meson field and quadratic in the baryon fields.

Synonym: Yukawa interaction

YUKAWA NONLOCAL THEORY is a theory of quantized fields using the principle of non-localizability of fields (which rejects the introduction of space and time coordinates as independent parameters on which the field operators depend, but proposes to treat space and time coordinates as observables represented by operators, and to characterize the space-time dependence of the field quantities by commutation rules) and the principle of reciprocity (according to which the fundamental equations of physics are symmetrical in space-time and momentum-energy).

YUKAWA POTENTIAL is a semi-phenomenological potential describing the nucleon-nucleon interaction. It is equal to the long-range part of every realistic nucleon-nucleon potential arising from a field theory of meson-nucleon interaction.

ZACHARIASEN MODEL is a field-theoretical model of elastic scattering where all chain diagrams are summed up.

ZEEMAN EFFECT is the effect in a magnetic field, of a nuclear, atomic or molecular energy level corresponding to a total angular momentum J split into $2J + 1$ equidistant components.

Synonyms: Zeeman components
Zeeman resonance
Zeeman spectrum
Zeeman transition
Zeeman interaction
Zeeman modulation

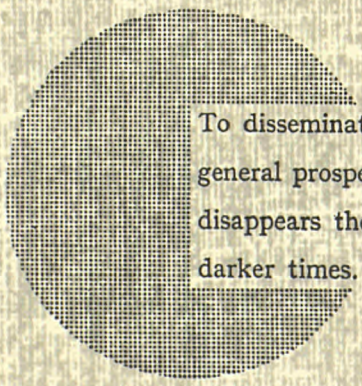
ZENER DIFFUSIONAL MODEL is connected with the diffusion of atoms in solids. The model is an attempt to interpret the temperature-independent constant D_o appearing in the Arrhenius equation for the temperature dependence of the diffusion constant

$$D = D_o \exp(-E/RT)$$

Synonyms: Zener model
Zener theory

ZENER DIODE is a junction diode designed to effect non-destructive breakdown from a very high resistance to a very low resistance at a predetermined voltage level.

Synonym: Zener voltage



To disseminate knowledge is to disseminate prosperity — I mean general prosperity and not individual riches — and with prosperity disappears the greater part of the evil which is our heritage from darker times.

Alfred Nobel

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